

What is claimed is:

1. A variable optical element comprising: a reference medium; a first area with a piezo-electric medium layer having a piezo-electric effect; and a second area without said piezo-electric medium layer, the first and second areas being formed on the top surface of the reference medium, wherein optical changes are imparted on the wave front of light made incident onto said first and said second areas to reflect the light based on changes in optical characteristics of said first and said second areas caused by the piezo-electric effect of said piezo-electric medium layer.

2. A variable optical element according to Claim 1, wherein a plurality of pairs of said first and said second areas are formed one after another in a cyclic manner.

3. A variable optical element according to Claim 2, wherein said piezo-electric medium layer changes in the thickness as a result of said piezo-electric effect corresponding to voltages externally applied, and wherein diffraction efficiency is changed for the light made incident on said first and said second areas based on phase changes in said first and said second areas due to said changes in thickness.

4. A variable optical element according to Claim 1, wherein said piezo-electric medium layer changes in the thickness as a result of said piezo-electric effect corresponding to voltages externally applied, and wherein diffraction efficiency is changed for the light made incident on said first and said second

areas based on phase changes in said first and said second areas due to said changes in thickness.

5. A variable optical element comprising a piezo-electric medium layer with a piezo-electric effect having at least a first area and a second area that are different in thickness, wherein optical changes are imparted to the wave front of light made incident on at least said first and said second areas to reflect the light based on changes in optical characteristics which are caused by the piezo-electric effect of the piezo-electric medium layer of at least said first and said second areas.

6. A variable optical element according to Claim 5, wherein a plurality of pairs of said first and said second areas are formed one after another in a cyclic manner.

7. A variable optical element according to Claim 6, wherein said piezo-electric medium layer changes in the thickness as a result of said piezo-electric effect corresponding to voltages externally applied, and wherein diffraction efficiency is changed for the light made incident on said first and said second areas based on phase changes in said first and said second areas due to said changes in thickness.

8. A variable optical element according to Claim 5, wherein said piezo-electric medium layer changes in the thickness as a result of said piezo-electric effect corresponding to voltages externally applied, and wherein diffraction efficiency is changed for the light made incident on said first and said second areas based on phase changes in said first and said second areas due to said changes in thickness.

9. A pickup apparatus which irradiates a light beam for recording information on an information recording medium and/or a light beam for reproducing information from an information recording medium on said information recording medium, comprising:

a variable optical element having at least one of a first area and a second area of a piezo-electric medium layer with a piezo-electric effect, wherein optical changes are imparted to the wave front of light made incident on at least said first and said second areas to reflect the light based on changes in optical characteristics which are caused by the piezo-electric effect of the piezo-electric medium layer of at least said first and said second areas, and wherein said piezo-electric medium layer changes in the thickness as a result of said piezo-electric effect corresponding to voltages externally applied, and wherein diffraction efficiency is changed for the light made incident on said first and said second areas based on phase changes in said first and said second areas due to said changes in thickness;

a light source to emit light to said first and said second areas of said variable optical element; and

an optical system to generate the light beam for recording information or the light beam for reproducing information based on diffracted and not-diffracted light rays that are caused when said variable optical element diffracts said light.

10. A pickup apparatus according to Claim 9, wherein the first area including a piezo-electric medium layer having a piezo-electric effect, and the second area no including any

piezo-electric medium layer, which are formed on the top surface of a reference medium.

11. A pickup apparatus according to Claim 9, wherein the first and the second areas are different in thickness.

12. A pickup apparatus according to Claim 9, wherein a plurality of pairs of said first and said second areas are formed one after another in a cyclic manner.

13. A pickup apparatus according to Claim 9, further comprising a photodetector to detect reflected light which is generated when said information recording medium reflects said light beam.

14. An information recording/reproducing apparatus which is equipped with a pickup apparatus according to Claim 13, wherein a means is provided to control at least the voltages applied to said piezo-electric medium layer among the power of said light emitted from said light source and the voltages applied to said piezo-electric medium layer.

15. An information recording/reproducing apparatus according to Claim 14, wherein,

at least when recording information onto the information recording medium with said light beam for recording information, said control means controls said diffraction efficiency so that the light beam power of said diffracted light assumes a level that will not erase information on said information recording medium by setting the voltage applied to said piezo-electric medium layer to a predetermined voltage level.

16. An information recording/reproducing apparatus

) . . . )

according to Claim 15, further comprising a crosstalk canceller circuit that suppresses crosstalk components based on the information output by said photodetector while it detects said reflected light.